



## Seismic Hazard Mapping Program

Department of Conservation  
California Geological Survey

# FACT SHEET

### SEISMIC HAZARD MAPPING ACT

The Seismic Hazards Mapping Act (Act) of 1990 (Public Resources Code, Chapter 7.8, Section 2690-2699.6) directs the Department of Conservation to identify and map areas prone to earthquake hazards of liquefaction, earthquake-induced landslides and amplified ground shaking. The purpose of the Act is to reduce the threat to public safety and to minimize the loss of life and property by identifying and mitigating these seismic hazards. The Act was passed by the legislature following the 1989 Loma Prieta earthquake.

Staff geologists in the Seismic Hazard Mapping Program (Program) gather existing geological, geophysical and geotechnical data from numerous sources to compile the Seismic Hazard Zone Maps. They integrate and interpret these data regionally in order to evaluate the severity of seismic hazards and designate *Zones of Required Investigation* for areas prone to liquefaction and earthquake-induced landslides. Cities and counties are then required to use the Seismic Hazard Zone maps in their land use planning and building permit processes. ***The Act requires site-specific geotechnical investigations be conducted identifying the hazard and formulating mitigation measures prior to permitting most developments designed for human occupancy within the Zones of Required Investigation.***

The Seismic Hazard Zone Maps identify where a site investigation is required and the site investigation determines whether structural design or modification of the project site is necessary to ensure safer development. A copy of each approved geotechnical report including the mitigation measures is required to be submitted to the Program within 30 days of approval of the report. A Certified Engineering Geologist or Registered Civil Engineer with competence in the field of seismic hazard evaluation is required to prepare, review and approve the geotechnical report. The Act requires peer review and this individual may be either local agency staff or a retained consultant. It must be noted that the Department of Conservation does not have authority to approve or disapprove the geotechnical reports; rather the data is utilized for future updates as well as monitor the effectiveness of the Program. In addition, cities and counties are to incorporate the Seismic Hazard Zone Maps into their Safety Elements. Both the Act and the Natural Hazard Disclosure Statement also require sellers of real property to disclose to buyers if property is in a *Seismic Hazard Zone of Required Investigation*.

### SEISMIC HAZARD ZONE MAPS

The Program will ultimately map California's principal urban and major growth areas. Each map covers an area of approximately 60 square miles and utilizes a scale of 1-inch = 2,000 feet. The maps are distributed in two forms - Preliminary and Official. The Preliminary form consists of a 90-day public comment period for technical review and comment. Once the public review period has ended, the Department of Conservation then also has 90 days to revise the maps, as appropriate, and issue the Official Maps to affected cities, counties and state agencies approximately six months after the Preliminary Release.

## **TYPES OF SEISMIC HAZARDS**

### **Liquefaction**

Liquefaction occurs when loose, water-saturated sediments lose strength and fail during strong ground shaking. Liquefaction is defined as the transformation of granular material from a solid state into a liquefied state as a consequence of increased pore-water pressure. The process of zoning for liquefaction combines Quaternary geologic mapping, historical ground-water information and subsurface geotechnical data. The Liquefaction Hazard *Zone of Required Investigation* boundaries are based on the presence of shallow historic groundwater (<40 feet depth) in uncompacted sands and silts deposited during the last 15,000 years and sufficiently strong levels of earthquake shaking expected during the next 50 years.

### **Earthquake -Induced Landslides**

Landslides tend to occur in weak soil and rock on sloping terrain. The Landslides Hazard *Zone of Required Investigation* boundaries generally indicate steep hillslopes composed of weak materials that may fail when shaken by an earthquake. The process for zoning earthquake-induced landslides incorporates expected future earthquake shaking, existing landslide features, slope gradient and strength of hillslope materials.

It should be noted that a single earthquake capable of causing liquefaction or triggering landslide failure will not uniformly impact the entire zoned area. However, the inclusion of mitigation measures throughout the zoned area will help limit the devastating impacts from an earthquake in the higher risk areas.

## **TYPICAL MITIGATION MEASURES**

### **Liquefaction**

- Excavation and removal or recompaction of liquefiable soils.
- Deep foundations such as piles and piers.
- Reinforced shallow foundations such as grade beams, combined footings, reinforced or post-tensioned slabs and rigid raft foundations.
- Other types of ground improvements such as permeation grouting, columnar jet grouting, deep mixing, gravel drains, surcharge pre-loading, structural fills and dewatering.
- Design of the proposed structure(s) to withstand predicted ground softening and/or predicted vertical and lateral ground displacements to an acceptable level of risk.

### **Earthquake- Induced Landslides**

- Incorporate slope stabilization methods such as buttress fills, subdrains, crib walls, soil nailing.
- Diversion methods such as catchment basins, and embankments.
- Avoid the failure hazard.

## **ADDITIONAL INFORMATION**

Visit our website at [gmw.consrv.ca.gov/shmp](http://gmw.consrv.ca.gov/shmp) to view and print Seismic Hazard Zone Maps, Evaluation Reports and Special Publications 117 and 118 or contact Candace M. Hill, Associate Planner at (916) 322-2718, [chill@consrv.ca.gov](mailto:chill@consrv.ca.gov), 801 K Street MS 12-31, Sacramento, CA 95814.